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ABSTRACT

This journal issue presents an overview of mother-child interaction during the first year of the child's life. Contents of the first section, which concern the development of the mother-child relationship, focus on the concept of the maternal instinct, mother and child during intrauterine life, birth of the child, the postnatal period (including the newborn's sensory and interactional abilities), characteristics of newborns, and phases in the development of homeostasis. The second section, which deals with interaction, discusses (1) sensory systems, including touch and smell, which contribute to interaction at close range; (2) sensory systems, including sight and hearing, which contribute to interaction at a distance; (3) interaction based on taste, and (4) interaction involving all of the child's senses, such as the feeding of the child. The third section explores psychosocial development, and attachment and multiple attachments as they relate to separation and child care. Concluding remarks emphasize that the mother-child relationship develops through communication, and that the development of the child's mental life and ability to love depends upon the opportunities made available for communication. (RH)

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1986 - N 164 - EARLY MOTHER CHILD INTERACTION

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ICC soon turned essentially toward Third World children and devoted its activities to the training and education of personnel with social, educational and administrative responsibilities as well as medical and paramedical workers. The desire for greater efficiency has led it to work increasingly with trainers and to concentrate its efforts on the methodological and educational aspects of mother and child care programmes.

ICC is also engaged in an attempt to further study — and — action on some aspects of the life and health of children and their family, so as to contribute to practical improvement, particularly in the fields of growth, nutrition, planned parenthood, the control of transmissible and nutritional diseases, preschool and school education, the needs of disabled and underprivileged children, etc.

Over this period of more than 30 years, a large amount of documents on children and adolescents, mostly from the developing countries, has been accumulated. This international documentation has been classified and sorted out, and has been computerized since 1983 : a bibliographic data base (BIRD : "Base d'Informations Robert Debré") may be consulted anywhere in the world, through international communications networks. ICC also publishes periodicals, educational documents and specialized bibliographic bulletins.

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EDITORIAL

In this work, we have attempted to present an overview of mother-child interaction during the first years of life. Although it is based on the considerable research done in the past twenty years, it is necessarily not exhaustive and contains some interpretations. It is, furthermore, the work of a Westerner, and makes no pretense of being universal.

The decision to publish it in **Children in the Tropics** may be criticized, since not everything we have written is transposable to different cultures. All children are born with the same potentialities, however. All are in possession of a set of sensory and motor abilities, ready to function provided they are repeatedly stimulated. Here we have a harmonious synthesis of heredity (the abilities) and environment (stimulation). Observers have conceptualized the neurological-sensory and psychomotor development of children in this way, while mothers have always known intuitively that their little ones were able to see, hear and feel, and to express themselves by crying on various tones and making faces, usually in response to their mother's attitude. The child's personality gradually structures itself through these exchanges; early, longlasting exchanges help to strengthen it.

Lucien HOULLEMARE
Scientific Director
I.C.C.

INTRODUCTION

Why have we called this issue "Early mother-child interaction"? What is the reason for this subject?

It may seem restrictive, since it only mentions the "mother", but the term "mother" is used in the broad sense here. The mother may be any person, not necessarily a woman, or the woman who gave birth to the child. She may be the "biological" mother, or the father, or any other person whose regular presence and loving care of the child enables the latter to develop strong emotional ties.

The total, balanced development of the child's personality, his/her ability to take interest in other people, to respond to affection and later, to become a loving, thoughtful parent all depend on the establishment of these early ties. They are the foundations on which the individual builds throughout his/her life, in his/her relations with people as well as with objects. They are created through communication.

It was long believed that infants were passive, since they were immature, and that their relations with their mother were one-sided: the mother stimulated and the child responded. Considerable scientific research and observation in a number of fields contradict this hypothesis. Infants are sensitive individuals, born with a great potential for interaction, ready for fulfilment. They are astonishingly active. Not only do they react to perceived stimuli, but they act on the person who produces them, so that the stimuli will be repeated or will cease. It is this particular type of relationship between very young children and those around them that makes the term "interaction" more appropriate than "relationship" or "communication", which are less precise.

As for the subject, there are many reasons for this journal to discuss it. The first is the importance of these first emotional ties for the child's future. The second is that the broad public knows little about it, although much knowledge is now available. Over the past thirty-odd years, and more particularly during the last fifteen years, many research workers in fields as varied as medicine, psychology, psychoanalysis, ethology and anthropology have taken interest in this previously neglected subject. Their studies are extremely rich, since they lead to a better understanding of this most delicate field of the child's emotional development through his/her relations with the environment. They are particularly valuable in helping us to understand them in a less passionate, more objective manner.

The third reason is that the field of emotional life is often neglected. The fact that equal importance should be attached to the satisfaction of young children's nutritional, health, motor, social, emotional and intellectual needs, so that they will develop harmoniously, is generally recognized. Often, however, more attention is paid to the satisfaction of physical needs than to children's emotional needs, particularly in situations of material and economic hardship.

The subject of "Early mother-child interaction" is a difficult one to deal with, since we wish to present a neutral discussion, without taking sides in some controversies or providing any recipes. Our objective is not to prescribe a model for child-raising based on emotional life, but to contribute to a better understanding of the way in which ties are established between infants and those who care for them, in accordance with the infant's abilities, the signs that enable us to observe this development, what is needed for mother-child interaction to be satisfactory, and the role of each partner.

I. DEVELOPMENT OF THE MOTHER-CHILD RELATIONSHIP

1. THE CONCEPT OF THE MATERNAL INSTINCT

Is there a maternal instinct? Mothering was long thought to be an "instinct"; that is, a behavioural model inscribed in the genes, and which is expressed automatically, regardless of circumstances. This conception is still quite widespread, although there is much proof to the contrary. It is true that some events may go unnoticed in certain cultural contexts, or else they may be so disturbing, or so spectacular that they are thought to be exceptional, and are not taken into consideration.

In some groups with very high birth and infant death rates, maternal disinterest in a child, which may lead to the child's death, is viewed as normal. There are even sayings which express this. In some cultures, for instance, it is customary to leave the mother alone with her child during the first few days, to determine whether the spirits of the ancestors will descend to visit it. If the child dies, it is said that the ancestors did not descend. On the other hand, in groups with a low birth rate, due to planned parenthood, and a low infant mortality rate thanks to advances in medicine and child care, this is considered inacceptable.

There is a sort of implicit ethical rule, according to which "all newborn babies must live and be loved", but not all mothers are able to conform to this rule. As a result, some children are unfortunately victimes of abuse by their mother (or by both parents). Sometimes this violence is serious enough to lead them to a hospital consultation, or even fatal. Other children may be abandoned. These are examples of extreme cases, but they furnish proof that the establishment of ties between mother and child is not automatic. Nor is it instantaneous.

The development of the mother-child relationship is a complex phenomenon. Interaction is both behavioural, which is easy to observe, and phantasied, far less observable. It is both universal, with features shared by all human relationships, and particular to two persons who interact with all of their individual specificities as well as those of the society in which they live.

2. MOTHER AND CHILD DURING INTRAUTERINE LIFE

The mother-child relationship begins to develop during intrauterine life. Fœtal movements are felt from the 12th week on, but often the mother claims to feel these movements only much later.

The mother's acceptance of this perception constitutes the first link in the bond which she will develop with her child; it represents recognition of the reality of the child's existence. Throughout her pregnancy, the mother creates physical and imaginary ties with the fœtus. She prepares herself mentally for its arrival. Gradually it begins to exist in her imagination, growing in her mind as it grows in her womb. Its reality is increasingly tangible as it grows in size, its heart beats, it moves about. Throughout her pregnancy the mother shares feelings with her child. Communication between their bodies is direct and constant. During this period the mother learns to recognize her child, and prepares herself to receive it.

3. BIRTH OF THE CHILD

The instant of birth plays a major role in the establishment of the mother-child relationship. For the mother, the encounter is double: with the child she has imagined, and with the real child. When they conceive the child, both the mother and the father already have an image, in their mind, of what the child will be. Each of them, separately, has slowly developed the project of a future child over the years, from childhood on. Often children project themselves in the role of their parents: that is when the imaginary child is born. It takes shape as they grow and mature, and continues to change until a real child is born. This imaginary child is invested with a life developed out of the past experience and personality of each parent, as well as the way in which motherhood and children are valued in the society in which both parents live.

The child born to a couple is the product of this double history. The chances are very slight that the real child will correspond to the combination of the two imaginary children formed in the minds of the two parents, and necessarily different, since they were imagined by two different personalities.

Birth, then, the mother's encounter with the newborn baby, may play a positive or a negative role, depending on whether the resemblance with the imaginary baby is great or not, or whether there is no resemblance at all. The baby's sex, physical appearance, any real or imagined resemblances or lack of resemblance, these are all factors which affect the emotional ties the mother has established with her imaginary child during her pregnancy, and which will affect the ties she gradually creates thereafter.

4. THE POSTNATAL PERIOD

Communication is the infant's essential mode of being. From birth on, children have a considerable potential for sensations and relationships, which enable them to enter into contact with their environment, and to participate in social relationships.

4.1. The newborn's sensory and interactional abilities

4.1.1. Sensory potential

In human beings, most of the sensory structures are elaborated between the end of the 2nd month and the beginning of the 7th month of intrauterine life. This occurs in a pre-defined order, which is the same for all vertebrates. The first system to develop is the dermal system, followed by the olfactory (smell) and gustatory (taste) systems. The labyrinthine system, which enables the body to maintain equilibrium and to locate its position in space, develops later. The auditory and visual systems are last to develop.

4.1.2. The dermal system and touch

The first sense to be awakened in the embryo is touch, through the skin. This develops along with the primitive nervous system, far earlier than all of the other sense organs. Towards the age of two months (6 to 8 weeks), the embryo already reacts in a lively manner, and attempts to move away if the area near its nose or upper lip is touched.

The foetus is sensitive to the tactile messages which cross the mother's abdominal wall. The skin sends a multitude of sensory information to the brain. The skin is the most extensive and most basic of all sensory systems. It contains sensory receptors for temperature (cold, heat), contact, pain, etc. Body contact plays a major role in the establishment of relationships: the child's first relationships and those he/she will establish throughout life.

4.1.3 The gustatory and olfactory organs

The gustatory organs are present and functional by the third month of intrauterine life. Throughout its gestation, the foetus swallows amniotic fluid. Taste already influences the amount of fluid swallowed during that period. It has been proved that the amount of fluid swallowed by the foetus increases if a sweet substance is added to the amniotic fluid, while it decreases if the taste is bitter.

The mother's diet affects the taste and smell of the amniotic fluid (as well as her blood and milk). The fluid varies, then, depending on whether or not she eats strong-tasting food. The gustatory organs thus receive much stimulation during intrauterine life, and have matured by the time birth occurs.

The functioning of the olfactory system while the foetus floats in the amniotic fluid is not accurately known. Like the gustatory system, it seems to develop during intrauterine life, since it is functional at birth. The child's sense of smell seems to be genetically programmed for the recognition of the attractive or repulsive qualities of some odours.

4.1.4. The labyrinthine system

The foetal labyrinthine system seems to be functional at an early age: between the 14th week and the 5th month of foetal life. This is a primitive, fundamental sensory system. It furnishes indications concerning the position and movements of the head. These are necessary for the static and dynamic equilibration of the body as well as for controlling eye movements. It is particularly stimulated during intrauterine life, since the foetus is in constant movement. It plays a major role during the postnatal period, when the main sensorimotor coordinations are established.

4.1.5. The auditory system

The auditory system also develops during intrauterine life. Most of the structures of the middle ear are anatomically well differentiated by the 5th month of intrauterine life, making hearing possible. However, there is a lag between anatomical maturity and the occurrence of the electric potentials necessary for functional maturity, and the exact moment at which the system becomes functional is not known.

Towards the 7th month of gestation, the foetus reacts to sounds produced outside the womb. A loud noise makes it start, for instance, even if the mother does not hear it. The foetus is able to discriminate between sounds with different frequencies. When a loud noise is heard, its heart beat increases and it moves away. It reacts more calmly to a white noise. When the same sounds are repeated, it becomes used to them and no longer reacts. A reaction then only occurs when a different sound is heard (1).

4.1.6. Vision

At birth, vision has been found to be the least mature of all sensory functions. It receives the least stimulation during foetal life. The eyes open during the 4th month of gestation. During the last months, the foetus is able to see. If a strong light is lit near the mother's belly and within the foetus' field of vision, it jumps, but if a subdued, red light is lit, it turns calmly towards it. It is capable of differentiated reactions. By their 4th day of life, 95% of newborns are able to follow a brightly coloured object with their eyes.

4.1.7. The ability to relate

At birth, newborn babies are able to send signals to the people around them, to communicate a feeling of greater or lesser well-being. They are not withdrawn, living in alternative phases of tension and relaxation, sleep and arousal. From the first minutes on, they behave in a predictable, ordered way, and immediately begin to interact with their environment. They are able to perceive signals and to react to them. They know which ones please them, and which are unpleasant. In the former case they try to intensify them, to make them last. In the latter, they try to avoid them, then show their displeasure.

4.2. Their characteristics

The sensory and interactional abilities of newborns differ from those of adults. Although all of the baby's senses are awakened at birth, this does not mean that he/she has the same abilities as adults. As time goes by, however, maturation and exercise develop the small child's sensory potential, so that he/she may achieve new performances which in turn will lead to further possibilities of action and expression.

Newborns are richly equipped for communication. They use all of their senses to dialogue with those around them: sight, touch, smell, hearing, taste. They use all of their possibilities for expression: shrieking, crying, movement.

As they grow, they acquire other means of expression: smiles, anger, speech, etc. They are sensitive, and receptive to stimulation. They are made for social interaction.

Their abilities are partial and limited, however. At the beginning, their perceptions are partitioned, in separate, uncoordinated pieces. The mouth has a space separate from the spaces perceived by touching, smelling or hearing, for example. When sucking, the infant is entirely absorbed by that activity. Once it has been mastered, it can be combined with others. The different organs are not yet able to work together to accomplish a function. Phonation (making sounds), for instance, is dissociated from hearing. Deaf infants babble in the same way as those who hear.

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(1) This is as habituation. It occurs for all of the other senses as well.

Furthermore, infants fatigue easily, and their abilities are momentary and changing. Aside from fatigue, an infant's sensory and interactional abilities are linked to his/her "states". This term refers both to the state of arousal and to the level of excitement and of motor activity and the quality of the infant's emotional experiences.

Wolff distinguishes 6 states. This is one commonly used classification.

Infants' "states", according to Wolff's classification

Class	Degree of arousal	Activity	Emotional experience	Availability for communication
State 1	Asleep	Regular sleep.		Not available. Withdrawal into him/herself.
State 2		Irregular sleep.		
State 3	Intermediate between sleep and waking.	Drowsiness.		Intermediate between withdrawal and seeking interaction.
State 4	Awake	Alert inactivity	Calm	Seeks interaction
State 5		Waking activity.	Excited or tense	
State 6		Crying.	Distress.	

States 1 and 2 correspond to sleep (state 1, regular sleep; state 2, irregular sleep), state 3 to drowsiness, and states 4, 5 and 6 to wakefulness.

The baby's "state" is important, where interaction is concerned. It tells the mother what her baby is experiencing: whether he/she takes interest in the outside world (state 4), is excited and/or tense (state 5), or distressed (state 6). It also indicates how available he/she is for interaction. States 4, 5 and 6 show an attempt at interaction, while states 1 and 2 express withdrawal. In state 3, an intermediate state, the baby is falling asleep or waking up.

The infant's "states" constitute a system by which he/she exchanges information with his/her mother. Many messages are transmitted and received by the infant. By falling asleep when rocked, after crying and screaming, he/she reassures her, telling her that her care was effective, but he/she also learns to relate that care with what preceded it.

State 4 is particularly important. The child is then fully alert and ready for interaction. The duration of state 4 increases during the first four weeks of life. Periods of calm, alert wakefulness are always longer immediately after feedings. Lack of hunger favours state 4. Hunger is associated with states 5 and 6.

Some stimulations lengthen the duration of state 4. This is the case when an object is moved before a baby's eyes, or when he/she is handled (1) or held (1).

The ability to remain in each state varies from one baby to another. The mother's behaviour affects the frequency and duration of states of calm, alert wakefulness in her child. It depends on her ability to recognize the different states in her child, and may cause a change of state.

The infant's sensory and relational abilities are modified by habituation. The latter puts an end to the newborn's attention, and is evidenced by decreased response to the repetition of identical stimuli. Habituation is always expressed by the fact that the child is no longer startled, and sometimes does not even respond at all. It differs from fatigue, since the child reacts again when the stimulation changes, however minutely. This shows an ability to discriminate finely between two stimuli.

4.3. Their evolution

Children's sensory and relational abilities are affe d by their development and interactive experiences. The mastering of a number of regulatory mechanisms enables them to organize their eating and defecation rhythms as well as their states of arousal, and to maintain themselves in a relatively relaxed state. This is known as homeostasis, and involves three phases.

First, the baby acquires predictable rhythms for eating, sleeping and remaining awake. This period, which occurs towards the 3rd or 4th week, is often called "primary adaptation". At this point, the mother has the feeling she "knows" her baby.

The second phase involves the regulation of body movements. At first, the infant's movements are jerky and limited; later they become more regular and more ample.

The third phase involves the regulation of states of arousal. The infant learns to calm down alone (by sucking his/her thumb, for instance) and with the help of others (the mother, or other caregiver). He/she learns to modulate the attention paid to the people and objects around him/her. Homeostasis is achieved through the infant's ability to calm down alone and the mother's ability to soothe her child. These abilities affect each other mutually. They differ with each baby and each mother. It is important for mothers to discover their child's specific reactions by observation. These exchanges exceed the notion of homeostasis, by far, and introduce infants to the world of communication. Their reactions become intentional. The notion of dialogue is acquired, with its two aspects: reciprocity and intentionality. Intentionality develops when the child becomes aware that he/she is communicating.

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(1) "Holding" and "handling" are Winnicott's terms.

II. INTERACTION

Human children possess great abilities at birth: these are both sensory (visual, auditory, olfactory and tactile) and relational (the ability to emit messages). They are immature, however, and remain dependent on those around them for survival for many years. The care they receive constitutes the foundations of the first interactive situations which they encounter. Through them, the mother (or the person providing care) enters into communication with the baby by sending him/her "messages" to which he/she "responds" with every available means.

Mothers can communicate through words and phrases, often replaced or accompanied by other, non-verbal messages. Infants always respond by non-verbal messages such as movements, sounds, crying, smiles, etc. Mother-child interaction occurs through sequences of reciprocal exchanges using those messages and signals which correspond to the child's development. For both mother and child, communication is established by the simultaneous use of several channels (touch, speech, etc.).

The exchanges experienced during childcare situations are not simply physical exchanges, nor are they based on sensations only. For both mother and child, they are sustained by an intense emotional life. The meaning attributed to the messages by the mother depends on her mental dispositions at the time, and on all of her past experience. The infant also interprets responses in accordance with his/her personality and experience. He/she is able to memorize a great many situations. Nothing is known of the foetus' memory, but the existence of memory at birth is attested (1). Infants' memories are lasting. They remember what is immediately valuable for their survival, what can provide intense satisfaction or avoid an unpleasant experience.

Their memory is based on experience. When a situation is repeated, the memory stored up is more intense. Children learn the meaning of messages through the repetition of interactive situations while they are receiving care. Children have a global, selective memory. They forget anything that is of no use to them. They are quick to assimilate anything useful, or any source of deep emotions, on the other hand. They record the totality of a situation, since all of their senses are activated at once. An example: a child does not calm down as quickly as usual when rocked by his/her mother, if she smells different from usual, because of a new perfume or some medicine.

All of these characteristics provide a further demonstration of the global, complex nature of the child's development in generale and his/her psychosocial development in particular. For the sake of clarity, mother-child interaction will be discussed according to the different channels of communication. We will first discuss those interactions based on the proximal sensory systems, followed by those requiring the senses working at a distance. We will then go on to those with their point of departure in taste, and will conclude with an example of interactions requiring all of the senses.

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(1) At age 45 hours, a neonate remembers a conditioned response learned 10 hours earlier. At 11 weeks, he/she can recognize a signal and respond to it one month after the initial stimulation.

This is an arbitrary classification, and does not contend that any single form of interaction is superior to any other form. It has been chosen because much of mothering is based on the reduction of the distance between mother and child. Much of the small child's behaviour (calls, smiles, etc.) is aimed at keeping the mother close by. It is in close contact that the ties between mother and child develop. These ties must be solidly established so that the child may take some distance from his/her mother, and become independent.

1. TO INTERACTION AT CLOSE RANGE: SENSORY SYSTEMS CONTRIBUTING TOUCH AND SMELL

1.1. Touch

As we have already said, touch is the first sense to be awakened. It is the child's first "language", and precedes all other languages. A tie is created between the person who touches and the one who is touched. This considerably influences the development of interpersonal relations, but touch is also important for the knowledge of one's self and of the surrounding world. It is inseparable from movement. Indeed, contact with a child is rarely established by touch only. In communicating, movement and touch are intimately linked.

Body contact plays a major role in all human relationships, in all civilizations, regardless of the degree of contact. Throughout its intrauterine life, the foetus enjoys skin contact which contributes to the establishment of the child's "basic security". Birth itself constitutes a sum of stimulations of the skin, to which are added the effects of gravity, unknown until then. In some societies (in India, for instance), babies are bathed at birth, so as to avoid the sudden contact with gravity. This practice has also been adopted by those Western obstetricians who favour birth without violence.

A mother's first act is to touch her baby. Infants receive a mass of sensory information immediately after birth, thanks to the activation of the skin receptors for touch, and of those which enable them to perceive the movements of their own body in space. The arms that carry them, the hands that touch and handle them, put them in communication with the people and the world around them. They need close contact with another human being. They learn to know themselves, to know their own body and to know others through the care and caresses given them. At a very early age, sometimes no later than one month, children may recognize a familiar person simply by the way he/she is carrying them. They then distinguish their mother from their father or from a stranger.

Children sense whether the person taking care of them is nervous or calm, they are aware of clumsy or self-assured movements, of kindness or violence. They react with all of their own sensitivity, and influence the behaviour of those around them. They derive feelings of security and trust from the way in which they are held and handled, and express these with the means available in their repertory. They are soothed and fall asleep when rocked, or cry harder, showing their well-being or a feeling of malaise or insatisfaction. They hold tight to a person to remain in his/her arms, or gesticulate, on the contrary, in order-to-leave a person's arms. Every individual has a personal way of caring for a child. Each child reacts in accordance with his/her personal characteristics. Mother-child rela-

tions are built up through care and carrying, in ways which are specific to each mother (or other caregiver) - and - child pair.

During the first hours and days following birth, a mother is specially sensitive to her baby; this facilitates and favours the development of their mutual emotional ties. The newborn, in turn, goes through a phase of increased sensitivity to body contact. For this reason, many paediatricians in Western countries advise mothers to have direct skin contact with their babies immediately after birth and during the first few days, and to massage their baby, as is done traditionally in some countries. Another widespread custom is that of carrying babies in close contact with their mother's body (on her side or back). This contributes to maintaining close contact between mother and child, and is in fact continued well beyond the first days of life, often until the child walks.

There are many other practices aimed at favouring body contact with small children. There is no use in describing them all; there is no recipe for rich mother-child interaction, which resides in true communication, with each partner adjusting his/her behaviour in a way appropriate to the other.

1.2. Smell

In addition to body contact, in which touch is inseparably linked with movement (tactile-kinesthetic communication), olfactory contact (smell) plays a most important role in the establishment of emotional ties.

Newborns are extraordinarily sensitive to smells. They may respond to different smells by different facial expressions immediately after birth. Olfactory recognition of the mother's breast occurs very early, sometimes on the 3rd day. By the 6th day, the infant's olfactory system enables him/her to differentiate between many natural smells. It develops throughout intrauterine life, when the foetus floated in the amniotic fluid impregnated with its mother's smell. Once out in the air, and in contact with his/her mother, the child is soon familiarized with her smell, and finds security in it. Gradually new smells are added: the smell of the skin, the nipple, milk, sweat, perfume, etc.

After 8 to 10 days, all of the mother's smells are familiar to her child, provided she does not change her perfume too often, and has enough contact with the child for him/her to learn them.

Observations of infants at that age show that they prefer a wad of cotton impregnated with their mother's smell to one with no smell or that of another mother. When the infant recognizes this smell, he/she shows signs of well-being. These are gratifying for the mother, and may lead her to show signs of affection. This smell has a soothing effect on small children, and they remain sensitive to their mother's smell for years. Most are still sensitive to it between ages 2 and 3, and one third between ages 3 and 5 years. This has been proved by experiments in nurseries and day-care centres. Repeated experiments have shown that when small children are asked to choose a sweater among several apparently identical ones, they show a definite preference for the one worn by their mother.

Mothers to are able to recognize their baby's smell and seem to seek it actively. They smell their babies frequently. Mothers who have had prolonged contact with their baby at birth recognize it sooner (by the 3rd day) than those who have only had routine contact, or a short contact three hours after birth. On the 9th day, however, olfactory recognition of the baby suddenly increases in the latter women.

Smell is one of the main ways for children to establish contact with their mother and with

others. It helps them to identify people and guides them to them. They then find themselves in a familiar universe, in which they feel comfortable. Children are attracted to what is familiar, and are uncomfortable with the unknown. They express this with their entire being, with their body and their face. The sight of them, when this contact has been established, is highly satisfying. The mother (or other person) feels reassured, and goes on to engage in a series of affectionate exchanges. In this reciprocal, happy relationship, both mother and child feel at one. These mutual exchanges contribute to the reinforcement of the growing ties between them, in which each partner has positive feelings.

Although communication by touch, smell and muscular tone is extremely subtle and does not belong to the field of visible behaviour, it occupies an important place among the means of communication between mother and child. Infants have a vital need for this close contact. It constitutes a "language" to which people are sensitive throughout their life, even when they have mastered other means of communication. It is a language created by a relationship, and is shaped by exchanges. This adjustment of the messages exchanged by mother and child is the basis of their mutual emotional ties. It can only occur by close contact.

2. SENSORY SYSTEMS CONTRIBUTING TO INTERACTION AT A DISTANCE SIGHT AND HEARING

2.1. Sight

Although exchanges by mother-child body contact occupy a central place in early life, other types of communication are also used. When mothers first enter into contact with their baby, they touch their limbs, first with their fingers, then with the palms of their hands. Next they look at their baby's eyes. Eye-to-eye contact is and will always be, throughout life, one of the main means of non-verbal communication.

At birth, newborns are equipped to focus and on follow the face of the person from whom he/she receives care. Observations of newborns on the delivery table, and especially those done by a paediatrician named Goren, have shown that newborn babies are programmed to pay attention to the well-shaped form of a human face. When shown a drawing in which the eyes and mouth are incorrectly located, they hardly glance at it. Their eyes remain glued to a drawing in which the eyes and mouth are in the right place in the face, and their eyes follow it. Newborns, then, are most interested in human faces. They see them as they are born, and during the first hours of life their gaze will rest on them, seeking their eyes, in a quest for an exchange. The seeing gaze and the interacting gaze are closely interrelated.

Looking and mutual exchanges of looks constitute a mode of interaction which begins with the newborn's first visual sensations. Sight is the least mature of all senses, however, as well as the least stimulated during gestation. At birth, the baby must become accustomed to light. Constant, intense light causes babies to close their eyes, while they open them wide and have sustained oculomotor activity when the light is dim.

Newborns do not see in the same way as adults. Their field of vision is limited, and remains limited for several days, before expanding progressively. Newborns only see

things in a range of about thirty centimeters from their eyes. They are unable to accomodate, and only at the end of one month do images become distinct. At that age, they become able to control their eye muscles, making sustained looking and binocular vision possible, through the coordination of the two eyes. Although they are capable of actively seeking another person's gaze, they are easily tired and cannot continue for long. As the days go by, their attention span increases. From several consecutive seconds at first, it increases to five minutes during the first week, but cannot exceed thirty minutes a day at that time. It reaches approximately thirty consecutive minutes at one month. At that time, the child may maintain his/her gaze during an entire feeding, for example.

Children's visual reactions are closely linked to their state or arousal. Some children have considerable visual activity, while others spend their time sleeping.

Children's increased visual capacities and longer periods of arousal in longer periods of visual communication with their mother. These reach a peak between one and two months, then decrease towards three months. At that age, the child's visual abilities have reached another level of development, at which he/she is led to explore the surrounding environment.

Towards the age of 2 months, perceptive changes occur in the child's gaze. He/she becomes capable of "looking around", and thus perceives the environment differently. At birth, he/she shows a preference for faces seen at close range, and for flat, highly contrasted, simple objects. Now he/she prefers volumes, as well as more complicated, shaded sights. He/she is able to accomodate and to see much farther, and is interested in many more things.

Towards 4 to 5 months, children have no difficulty in following a moving person with their eyes. This new ability, along with progress in their motor and mental faculties, increases children's field of communication and introduces them to the field of communication at a distance. Formerly, in fact, their limited visual and motor abilities restricted communication to the nearby surroundings. Maturation of their nervous system, plus exercise, improve their abilities of all sorts: their attention span increases, they remain awake longer, see better and further, particularly since they begin to move about, thus further expanding their field of vision.

Communication at a distance is not simply a question of proximity, however, nor of distance; it is made possible by children's enormous progress. By communicating, children learn to communicate, and develop emotional ties. Communication becomes a way for them to keep the person (or people) with whom they desire contact close by. The expression of this desire shows the course followed by their mental and emotional life, the latter being linked to their relationships with others. In the absence of human contact and communication, the infant's mental life is not awakened (1). From birth on, the infant's visual activity is interpreted by his/her mother; its sense differs, and only becomes completely meaningful in accordance with her interest in it.

When a child looks straight at his/her mother, she has the feeling that he/she recognizes her, wants her gaze, her talk, her caresses, in return. And she actually does engage contact with him/her simply because of that look. Whatever direction her child's gaze takes is rich in meaning for her. When he/she looks straight into her eyes, this is an invitation to closeness. Turning away of the head is interpreted as a sign of withdrawal or distate.

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(1) Deaf infants cease to babble, and do not learn to speak.

Dialogue is avoided or broken off by a lowering of the head. Looking sideways is a more ambiguous signal. It may be interpreted in such a way as to pursue the dialogue between mother and child or to interrupt it. This depends on ther mother's availability, whether she wishes to relate to her baby or not, and how she goes about doing so. She may seek out her child's gaze, so that he/she sees her clearly, thus establishing contact. She may also think the child is tired, and avoid eye contact. Lack of stimulation then puts an end to the developing communication.

In interpreting their child's moods, mothers also observe their facial expressions. Newborns express their basic emotions through these expressions, which are produced by innate factors, and are interpreted similarly in all societies. At birth, newborns may have a facial expression suggestive of a smile. They are able to copy smiles and other adult expressions such as sticking their tongue out, at a very early age. Archaic movements, precursors of smiling, are commonly observed in delivery rooms. Infants aged 12 to 21 days have also been seen to imitate adult facial expressions.

At first, these facial expressions are the baby's only way of expressing his/her state and feelings. The message may be perceived by the mother, who then responds to it, or it may go unnoticed.

During the very first weeks, for example, mothers do not seem to be affected by their baby's smiles or attempts at smiling. At a certain point, they smile back at what they consider to be their baby's smile. This interpretation of the baby's facial expressions plays a major role in the development of social communication. By adjusting their face to what they perceive in their baby, mothers communicate their perception of the child's emotional state. The mother's face plays the role of mirror, in which the child will read the reflection of his/her own feelings.

The child learns this language, in accordance with the possibilities for interaction available, and uses it in response to stimulations, thus reaching another stage, in which he/she is able to use it intentionally. Facial expressions, which were simply means of self-expression at first, thus become means of communication. The child will use them to communicate.

The intentional use of the smile is an important stage in infant development. It occurs between the ages of one and 2 1/2 months, approximately. It is well established by age three months, and is used systematically to engage in communication with any person looking straight at the child. By this time the smile has become a tool. At first it was just a reflex, then it went through an intermediate phase in which it was set off by an outside factor, and finally, it is used deliberately, to communicate.

It plays a most important role in the development of human communication, and in the mother-child relationship. A baby's smile reassures the mother, tells her she is providing proper care and is distinguished from other people, that her baby loves her and seeks contact with her. The use of the smile is one of the first means of intentional communication at a distance. The baby uses it to reduce the distance that separates him/her from the mother, and to begin interaction. The latter then continues by exchanges of smiles, and by the other means of communication at the child's disposal. Only in interaction does the child's smile, and all of the other means of expression, become means of communication. This requires that they be recognized as signals and interpreted by people in contact with the child, so that they become a language, and are used as such.

In addition to their exchanges of smiles, gazes and facial expressions, mothers and children use gesturing as a language. Mothers teach this language to their children by

interpreting their gestures as signals, and responding to them. For example: at age six months, and until they can walk, children hold out their arms when their mother approaches. If the mother interprets this as expressing the child's desire to be picked up, and actually does pick the child up each time this occurs, he/she learns the meaning of the gesture, and uses it intentionally. Although the mother may view this gesture as a desire to be picked up, it may in fact have many other meanings, depending on the child's mood. It is in fact heavy with emotional meaning. It may represent proof that the baby recognizes his/her mother on sight, even if he/she does not yet have the faculty to do so. Before age 6 months, a face only represents lines and surfaces for infants. Only toward 6 or 7 months does it come to signify a face. Later, toward 8-9 months, children really recognize faces and express themselves differently depending on whether they are familiar or unknown. They show fear of strangers, indicating an awareness of the presence or absence of their mother. They are capable of identifying her when she is not present, and of imagining her. They expresse both their anxiety at being separated from her and the positive feelings they experience in her presence. The child's anxiety in the presence of strangers, with all of its implications for the mother, affects her, in turn, and the emotional ties she has created with her child.

2.2. Hearing

From communication through exchanges of gestures, smells and caresses to the recognition of faces and the deciphering of gestures, the road is long, and the infant's emotional, motor and intellectual faculties have developed. Communication at a distance has been added to communication at close range. The language learned through exchanges of gazes, facial expressions and gestures has introduced the child to symbolic communication. To achieve his/her identity as a human being, the child must learn spoken language. The latter is the basis of more elaborate communication, the height of which is attained when the human being is able to transcribe it. Spoken and written language is the privilege of the human race. It maintains and weaves ties, regardless of the physical distance between two people. Spoken language places the child in the world of symbols, to which he/she was introduced by the deciphering of gestures and facial expressions. It is added to the other means of communication at the child's disposal, but does not replace them. Human beings need all of their senses, all of their languages in order to communicate fully. In the long run, they cannot be satisfied by communication at a distance. Be they simple or complex, emotional ties cannot do without any one language.

Mother-child interaction based on spoken language is prepared during intrauterine life. At birth, the infant's auditory system is quite functional, since it has been stimulated throughout gestation. The uterus is a noisy place, in which the foetus perceives sounds coming from inside the mother's body and from outside, although the latter are attenuated by the maternal body tissues and the amniotic fluid.

The sounds from outside include the mother's voice, which stands out from the background noises. It resounds a bit unusually, but the child becomes familiar with its rhythm and intonations. Other voices, near by, may be heard; they are somewhat less distorted than the mother's voice. Lowpitched sounds, be they voices or other noises, are heard best: in particular, male voices are more audible than female voices. Hence, the newborn is quite prepared to hear different categories of sounds.

The baby's environment changes radically at birth: the background noise disappears. Sounds, music, voices and speech may now be heard without "interference". Infants are able to discriminate between sounds which differ only very slightly in intensity or pitch.

As for speech, experiments have shown that infants are able to distinguish between two phonemes — that is, two sounds such as "pa" and "ba" — which only differ in a single acoustic respect. The auditory perception of two month-old infants is identical to that of adults in all respects. The perception of verbal sounds is clearly conditioned by the child's environment. At birth, children possess infinite perceptive abilities (those of all human beings, taken collectively) (1). Like their other abilities, these only become functional if they are stimulated, and it is impossible to stimulate all of them. This would not be desirable, in fact, since overstimulation has a negative effect, equivalent to a lack of stimulation. The choice of the perceptive abilities which will be developed is conditioned by the environment. This is particularly true of the discrimination of linguistic sounds (2).

It is a long way from hearing to interaction using the auditory route. Hearing is only one phase, during which the child receives information, which must then be processed before a response may be formulated. The latter must then be perceived and interpreted, in turn so that another response may be given. For example: when a child is born, he/she hears his/her name pronounced, but does not react to it, since it is not yet meaningful. Gradually, the music of the name becomes linked to him/her. It takes time for the child to learn that it is an invitation to establish communication, and even more time to obtain a response to the little sprieks or babbling with which he/she greets that name once it is recognized.

Very little is known about the way in which children establish this relationship, and the bases on which it rests. One striking fact is babies' receptiveness to human signals. Infants react differently to them, in comparison to non-human signals. Research has shown that when a noise occurs while an infant is peacefully sucking, he/she stops sucking, then resumes immediately. If he/she hears a human voice, sucking is interrupted and then resumed in very active sequences separated by regular pauses, during which he/she seems to await the sound of the voice (3). Newborns seem to be programmed to obtain reactions from the person who feeds them.

Another important fact is the newborn's identification of the mother's voice. The observation of babies several days old has shown that they react to their mother's voice in a special way. Babies suck longer and more vigorously when they hear their mother's voice — with no other identification sign — than when they hear a strange voice. This is only true if the mother speaks in her usual voice. This shows that the baby identifies and values his/her mother. It is possible and highly desirable to detect children with hearing problems at a very early age.

Mothers, too are able to distinguish their child's vocalizations from those of other infants. These play a major role in the development of the child's ties to the mother. They contribute to their closeness.

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(1) The ability to discriminate linguistic sounds which do not belong to the mother tongue decreases with age.

(2) Any child is capable of learning any language.

(3) This type of rhythmic activity is called a patterned reaction. The intense activity/pause pattern is part of the child's repertory at birth.

Crying may also be detrimental to the parent-infant relationship.

Some babies cry very often, utter unpleasant shrill screams, and are difficult to calm down. This sometimes creates great tension in their parents, who worry about being incompetent as parents. Just as they feel reassured of their role when they are able to soothe their baby, they feel depreciated when they do not succeed.

Such situations may well disturb the establishment of parent-infant ties. In some extreme cases, in fact, crying may be one of the contributive factors in child abuse.

According to the ethologist BOWLBY's terms, they constitute the equivalent of an "acoustic umbilical cord". Mothers are sensitive to their child's cries. These cause the mother to act, and therefore positively affect the amount of care received by the child (a baby who cries often and over long periods of time has more interaction with his/her mother than a calm baby). Crying and shrieking are the main modes of communication by which babies express their needs and their state.

Newborns are capable of feeling a wide range of emotions and sensations, but their manifestations are hardly differentiated during the first days of life. During the first month, they wail (in a guttural tone) and cry often. Within weeks, they learn to modulate their calls, since they become more aware of their body, and also because their mother reacts differently to different types of cries.

By the end of the first month (1), they cry in a special way when they are wet, for instance. They are also more receptive to speech. During the second month, they gurgle when content. At 3 months, they cry less. Although they do not understand the meaning of the words, they are sensitive to those addressed to them, and communicate by babbling (the repetition of distorted syllables). Towards 5 months they are increasingly attracted by human voices: they turn their head, looking for the person who is speaking. A real "coded conversation" is gradually established between child and mother.

Towards 6 months, children become aware of variations in a voice: a sharp tone or shouting may move them to tears. At 7 months, another stage is reached: children use their vocal abilities to attract their mother's attention. They intensify their lallations (trills and repeated syllables), to retain their mother, cry when she goes away and calm down when she speaks to them, even from a distance.

By 8 months, children possess the rudiments of speech. They are able to pronounce some syllables. From this point on, the actual acquisition of spoken language begins. Before then, the mother's talk is not aimed at teaching her child to speak, nor at transmitting information; rather, it is a melody, accompanying child care. It is composed of onomatopoeias, exclamations, beginnings of isolated words, and babbling imitating the child. This is closer to communication by body language than to spoken language.

When the child begins to pronounce syllables, these have no specific meaning for him/her, but the mother interprets them as words. "Da", "da", "da" or "ma", "ma", "ma" become daddy and mummy. The child thus associates a word with a person, an object or an action... The same words will later be used to represent these when they are absent.

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(1) This is an approximate date, as are the subsequent ones. Each child develops at his/her own pace, more or less rapidly depending on his/her initial potential and environment.

It is through their aptitute for communication, developed through all of their previous interaction with their mother, that children gain access to spoken language. It is also because they constantly hear people speak: in their world, all experience is filtered through words.

From birth on, mothers immediately consider their baby as a speaking creature. By responding to the child's crying and shrieking by acts, they give meaning to them. The child thus learns that they are signals, and gains access to the world of symbols.

Mothers change when talking to their baby. At first, vocal exchanges between mother and child concern only their emotional state. The mother regresses to her baby's mental level: the two gurgle and babble together. The mother speaks, as well, but she changes her manner of speaking so that her baby will understand. She changes the pitch of her voice, uses a higher tone than usual, and speaks softly. She lengthens the vowels: in fact, babies are more sensitive to this kind of speech than to the usual manner of speaking. She "cuts up" information into short sequences. She acts as if the baby can only absorb small bits of information at a time. She seems to allow time for him/her to assimilate each stimulation before offering other ones.

In this way, mothers help their children to make emotional and social progress by introducing them to the world of verbal communication. Speech, which provides children with the ability to communicate at a distance, enables them to begin the process of mental separation, by which they experience themselves as "distinct" from their mother. It also contributes to their cognitive development.

Speech introduces children to the world of abstraction, to the symbolic representation of beings and objects. Without it, they would be unable to structure thought.

3. INTERACTION BASED ON TASTE

Gustatory sensations (taste) play a major role for newborns, since food and feeding are extremely important experiences at that time of life. They lead to considerable interaction between mother and child.

Gustatory responses to different tastes are genetically programmed. Each of the four basic tastes (sweet, salted, sour and bitter) produces a specific facial expression in newborns. These are identical in different individuals for a same taste. They constitute a reflex: the gustofacial reflex.

The sensory nervous structures of human infants are predetermined and pre-adjusted to their function of controlling food intake. Infants have a genetically preestablished preference for sweetness and an aversion to bitterness (1). Within hours of birth, they suck actively when given a sweet liquid, but stop suddenly when a bitter solution is given.

During the first six months of life, children make faces whenever they eat food, or take medicine, for instance. These faces are unavoidable and mechanical. They are not accompanied by crying, and are never addressed to another person. And yet, mothers immedia-

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(1) A bitter taste generally corresponds to toxic substances.

tely interpret their children's faces. Often they make the same faces simultaneously, sometimes even beforehand. They make comments, saying "This is good" or "this is bad", "you like this" or "you don't like that", thus unhesitatingly, assertively identifying with the child. Their remarks are not questions, they are assertions. The meaning of the faces is perfectly clear.

During a second phase, between 9 and 14 months, babies begin to make more subtle responses to gustatory stimulations. Gradually these become integrated in their repertory of facial expressions. Mothers continue to observe and comment them.

Toward 16 months, a change occurs. Children use their facial expressions to communicate with others. They orient them towards the person with whom they wish to communicate, accentuate and repeat them intensely so that they will be noticed. They transpose them to other contexts. The expression for sweetness is used for what is good, pleasant or gay, the one for bitterness for what is unpleasant. Once an innate reflex, the facial expression has become a means of communication.

Human infants possess a rich potential for communication, which can only be expressed and developed in a human environment. Like shrieking, crying and smiling, the gustofacial reflex can only become a language on that condition.

4. INTERACTION INVOLVING ALL OF THE CHILD'S SENSES: THE EXAMPLE OF FEEDING SITUATIONS

Mother-child interaction during feeding situations is infinitely complex. It is most important for the child's future, both with respect to development (psychosocial, emotional and intellectual) and to his/her dietary balance.

The dietary balance of the newborn, the child, the adult and the future parent, depends on the establishment of a balanced relationship with the mother and/or with the adults who feed him/her.

This relationship varies with the levels of exchanges and with the demands made on the child. The feeding situation revives many phantasies dating back to the mother's (1) childhood and early experience with food. Feeding takes place under heavy pressure from the social and cultural environment.

There is a dynamic process involved in mother-child interaction with respect to feeding. It changes as time goes by, as both child and mother change. It is affected by internal factors inherent to each of them, and by external factors imposed by the environment.

At birth, newborns are programmed to be able to eat. In addition to the burrowing reflex, by which they seek and find the nipple, they are able to suck. All of the mechanisms required for sucking are ready. Each child is programmed internally to suck according to a specific rhythm, which may vary with the amount of milk running from the breast or bottle. Sucking is synchronized with swallowing and breathing. It is the first means of contact with the outside world.

(1) Or the person who does feeding.

Along with this capability, human infants are faced with a new sensation at birth: hunger. This was unknown during intrauterine life, and brings them to the discovery of frustration, and of desire.

At that point, the relationship that develops between mother and child is more physiological than psychological. The newborn finds an equilibrium in the satisfaction of hunger, feels, pleasure when fed and discovers the sensation of fulness, which then replaces the discomfort of hunger. In this state of complete dependency, being loved and being fed are all one. The mother-child relationship is not established automatically, regardless of whether the child is breast or bottlefed. Mother and baby gradually arrive at harmony. Often a period of 3 or 4 days is needed for the child to organize his/her sucking rhythm so as to synchronize it with his/her mother. Furthermore, both must seek out positions in which they are comfortable. These are not instinctive, and must be built up by the two. This shared search claims all of their attention. Then, gradually, the mother-child couple grows. The infant matures and masters the situation, becoming capable of greater attention and taking advantage of all of the stimulation offered. Every sensory function, every sense organ is involved in this process. The child perceives the taste of the milk, its smell, and the smells coming from the mother. He/she feels the warmth of the milk and of the mother's body. The contact with the mother's body, the harmony of their shared positions, produces a feeling of well-being.

All of these sensations contribute to a feeling of bodily comfort which enables children to take interest in the outside world. They gradually discover their mother's gaze, and the two engage in a new mode of communication. They also hear her speak to them, and become interested in her words. Gradually, eating comes to be associated in the child's mind with a period of pleasure and intense relating with the mother.

Many factors play a role in the establishment of a rich, harmonious relationship during feeding sessions. First, the baby's appetite. A baby who sucks well and "grows" well is more gratifying for the mother. She feels reassured in her role as mother. If she breastfeeds her child, she often concludes that her child likes her milk, and by extension, that he/she likes (loves) her. The mother considers a healthy appetite as proof of love, and in return, she gratifies the baby with affectionate attentions.

Some adults often still assimilate love and food, as they did in infancy. Children are often asked to eat such or such a food, for instance, to please an adult, or are offered a special dish as a reward. When the child has reached a certain level of development, this ambiguous attitude may produce a bad mother-child relationship in the eating context. In time, the situation may deteriorate to the point of becoming conflictual.

The tonic and motor potentials of mothers and children also affect their relationship considerably. They may facilitate, or on the contrary, hinder the adjustment of the couple's position. More specifically, they condition children's reactions to hunger, and their mother's response. Very active infants react intensely to hunger, and immediately alert those around them. The less active express themselves more discretely, and consequently must wait longer to be fed. The time which elapses between their call and the response is so long that it takes them longer to come to the realization that their signals are meaningful to their mother. Difficulty in emitting clear signs to express one's state — hunger, in particular — may be considered the human being's first failure in communication.

As we have already seen, the infant's visual activity plays a major role in mother-child exchanges, since they are close together during feedings.

As children grow, their potential for communication develops (facial expressions, speech), their diet changes and their interactions are modified. They are no longer centred around the mother. Food participates in these exchanges, and is present, between mother and child. Its role in the relationship differs with the child's sensitivity to taste and the extent to which it is valued by the mother.

Mother-child interaction in feeding situations — and in other situations as well — is only partially conditioned by the child's characteristics as a developing human infant or by the individual personality of mother and child. These interactions are greatly affected by the human and cultural environment in which they evolve. The type of feeding chosen, for example, does not depend solely on the mother, her physical condition and her availability.

Her family and medical advisers, public opinion and the mass medias also influence the decision to breast or bottle feed, for example. The same is true for weaning. In many population groups, weaning is not decided by the mother or the child; sometimes it is the father who decides, at others it is custom. In this case, food plays a role in transforming mother-child relations. Weaning, for instance, marks a break-off of the unique mother-child couple which the two have created together. This is painful for both mother and child, particularly when it occurs suddenly, since it forces them to abandon, once and for all, the mother-child dyad to which they will never return. The difficulty is often compounded by the fact that the child is then entering social life. Weaning is often synonymous with the acquisition of a sexual identity and implies a new type of relationship with the mother and with children in the peer group. The child is no longer a baby but a boy or a girl, and no longer has the status of a suckling, but of a porridge or millet-eater, for example, with all of the attendant obligations.

Mother-child interaction during feeding situations has the same foundations for all children: these are dictated by the specific capabilities of each human infant. They change as the children develop and learn. They are specific to each mother-child couple, within which each individual behaves in his/her own way. They develop within a social context which is a mixture of customs, beliefs, values and knowledge. They depend on the role and place of the mother and of the child, as well as the way in which their particular culture devines the concepts of mother and child.

III. INTERACTION AND ATTACHMENT: PSYCHOSOCIAL DEVELOPMENT

1. PSYCHOSOCIAL DEVELOPMENT

The development of emotional relations between children and the human beings with whom they are in contact is a long process. Children develop ties with one person, exclusively, or with several people, depending on their social context, the possibilities for interaction, their personality and that of the people around them. It is the attraction to human beings, the seeking out of their company, that is known as "attachment".

The human infant's attachment (or attachments) to other human beings does not occur anarchically. It goes through three basic phases: the child's initial attraction to other human beings, to the detriment of inanimate objects, learning to recognize them, so that familiar people may be distinguished from strangers, and the ability to become attached to some people, whose company is sought; the mother, in particular, or any other person with whom the child has stable, regular relations.

Attachment is only one phase in the child's psychosocial development, the outcome of which is the conquering of autonomy, or detachment. (Individual dependency may be seen as a disordered functioning of attachment). The emotional dependency that characterizes the infant's relationship with his/her mother is indispensable, and it remains most important during the first two years of life.

The newborn's desires are fulfilled through the satisfactions experienced in the relationship with the mother, thanks to the permanence of her physical and emotional presence. When their child is born, mothers are in a special mental state (1) which enables them to adjust to their baby's very first needs. The baby reminds them of their own past. They identify with the child, and feel what he/she feels. Attachment therefore takes the form of a relationship in which the mother first plays the most active part, since the baby is quite immature. The infant's attachment behaviour occurs later. During the first month, he/she moves from inherited reflexes such as burrowing and sucking, for example, to oral activities and contact. By the end of the first month, emotional responses such as smiling or temporary ceasing of crying may occur when a face is seen, a voice heard or any human contact felt. Intentional smiling at a human face, seen full-face, regardless of the person, is the first sign of mental organization in babies.

Children's manifestations of attachment soon become stronger and more frequent (they enjoy playing, show joy when approached, disappointment when a person goes away), while their mother's attention, on the contrary, decreases as they grow and gain autonomy.

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(1) Winnicott calls this state "maternal madness".

The intensity of the first relationship with the mother contributes to this evolution. At first, the experience of childbirth represents an insurmountable separation for the mother ; she compensates for this by devoting herself exclusively to her child. Later she changes, and goes on to invest her energy in other roles, such as wife and lover, for instance.

This may help her to take some emotional distance from her infant. Both mother and child begin to move out of their "original dyadic relationship". This emotional distance within the relationship creates a new space which did not exist in the extremely close earlier relationship. The child, now able to fill the gap left by the mother's absence, is led to create a system of compensations. This system is both physical and mental: the baby calms down by sucking his/her thumb, which "replaces" the mother when she is absent. The satisfaction experienced in the relationship with the mother, and her continuous presence at an earlier phase, enable the child to "phantasize" her presence, to tolerate brief absences and to be assured that she will return.

The development of representation is essential, and rests upon the child's concrete experiences. Visual communication plays an important role in this process. The human face constitutes a visual stimulus which the child encounters very rapidly, and it is therefore inscribed in the memory at a very early date, probably by the age of 6 weeks.

If the child is to start on the road to autonomy, it is important that some emotional distance between mother and child follow the original closeness. These steps toward autonomy are necessary in order for the child to become a separate individual, distinct form his/her mother and those around him/her, capable of turning outward, discovering and exploring the world, and finding new satisfactions within it. They are the prelude to socialization.

In order to feel distinct from their mother, children must come to recognize their body as a part of themself and the mother as a separate person. In doing so they go through several phases: emotional distancing, separation and individuation. The evolution of the visual function contributes to the establishment of mental interiorizations. The perception of depth of field, for example, and of relief, plays a role in the constitution of the notions of Self and of the Other, and of a distance between Self and the Other.

Children's recognition of their mother and the exclusive investment of their emotional potential in her represents a milestone, making an evolution in their relationship. During early infancy, towards 3 months, for instance, children grasp at all adults, indistinctly. One person may then easily be substituted for another at that point. This is no longer the case for 7 or 8 month-olds, who are able to recognize their mother. They react strongly to the presence of a stranger, and suffer from their mother's absence. They are no longer content with whatever person is present, but call for their mother (or a usual caregiver).

Their ability to love has been developed by their special relationship with their mother, and this enables them to direct their love to other people, or to transfer it to objects which replace her temporarily.

At first mother-child relations are completely centred around the two of them. Then, gradually, the mother introduces objects within the relationship. The child's first object relation is his/her relation with food (be it breast milk or the bottle, as the case may be). During the very first feedings, the mother gives the baby the illusion that the breast is a part of him/her, by adjusting herself totally to the child. Gradually, as the child becomes capable of accepting frustration, she disillusions him/her. She can only succeed in bringing her child to this new phase if she was successful in the first phase.

Children become autonomous through the development of the object relation. The

latter is built up by exchanges with the mother. It is through the mediation of objects that children come to realize that they are distinct from their mother, and that she can compensate for their incapacities. When a child is playing with a toy, for example, and the toy falls, he/she cannot retrieve it without the help of his/her mother. Through such play situations, children learn to play with objects and to take interest in them, with their mother's help. This ability to take pleasure in a triangular situation with their mother and an object such as a toy enables them to decentre their relationship. From then on, they are able to delude themselves, and to transpose their love onto an object, called a transitional object (a "teddy bear", blanket or other), to which they cling, carrying it everywhere.

The transitional object constitutes something concrete to which the child may transfer his/her life when the mother is absent. It provides a transition between total emotional dependency and autonomy.

Learning to speak has a similar function in children's relations with objects. The transferral of love from the mother to an object materializes the child's mental life and its evolution; the same is true of the acquisition of the value of words as replacements for objects or people, and their use. The mastery of speech and its evolution are the fruit of interaction with the mother, then with an increasing number of other people. They are indications of the child's ability to relate, and of his/her mental and social evolution. This is well illustrated by the possibility of naming objects so as to obtain them, or people so as to enjoy their presence. The same is true of the use of the pronoun "I" instead of the 3rd person (1), which attests to the long road travelled from birth, when the child was at one with the mother and could not speak, to the use of "I" identify him/herself, following an intermediate phase during which he/she identifies with the concept of "baby", or with a name. These limited examples show the importance of social interaction in the construction of the child's emotional, social and intellectual personality.

The nature of the mother-child bond changes in accordance with their interaction. The latter contributes to the child's emotional evolution. Emotional development is essential to the child's intellectual development, which in turn provides support for emotional life. Infants are originally asocial, then develop a practically exclusive bond with one person. The establishment of this bond is a factor in progress, and enables them to detach themselves gradually from this bond to create other ties, and to turn to the outside world.

2. ATTACHMENT AND MULTIPLE ATTACHMENTS: SEPARATION AND CHILD CARE

At this point in our discussion, the question of whether children are exclusively attached to one person or may develop different attachments no longer seems pertinent, given the specific way in which the mother-child relationship is built up, as we have seen. It is clear, as Schaffer says, that "a child's ability to develop attachment is not to be shared, like a cake".

Infants are able to create many relationships with those around them. Each of these is specific, precisely because it is based on interaction. A unique relationship is established

(1) Towards 3 1/2 - 4 years.

through a unique process (1). It is not determined once and for all, and varies with the child and the other person. Each child has his/her own, personal physical and emotional constitution and sensitivity to tension. He/she singles out those stimuli to which he/she is sensitive, and responds at his/her own perceptive and motor pace.

Each of the baby's partners is influenced by his/her own personality and that of the child. Each approach is personal. It is built up and developed at the child's pace as he/she learns and becomes able to communicate.

Infants do not establish uniform relationships. Quite soon, probably by the age of 3 months, they are able to distinguish familiar sights from strange ones. Each relationship is specific; it cannot replace, modify or supplant another one. Children act differently in a same situation when in contact with different people. When eating, for example, a child may refuse certain dishes when ofered by his/her mother and accept them from someone else, or vice versa.

Children's attachment to any one person is based on the same principles which preside over all attachments: it requires exchanges, and time. It is created by two people. Children have an infinite ability to love and become attached, provided the situation is favourable.

Research on mother-child separation in day-care structures has confirmed children's potential for multiple attachments. These investigations provide new information, inasmuch as they study mother-child separation under satisfactory conditions (for short periods) (2). They disprove the hypothesis according to which children's physical dependency leads to attachment to the mother only (3), she being the only person who can receive their demonstrations of love.

There has been much research on separation, and paradoxically, the conclusions have provided support for the notion of attachment.

Harlow has studied the effects of separating baby monkeys from their mother, under experimental conditions. The baby monkeys were separated from their mother at birth, and given a "surrogate mother" instead. One "surrogate mother" was made of wire, the other of cloth. The wire mother had a baby bottle, while the cloth mother did not. Under experimental conditions, Harlow found that the wire mother was of no help to the baby, who turned to the cloth mother, with which it spent most of its time. The baby monkey maintained constant contact with the cloth mother, even during feedings.

These studies concluded that the most important element in the relationship was not food, but physical contact.

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(1) Mothers who raise twins have different relations with each of them. Children within a same family establish a specific relationship with their mother and father.

(2) As opposed to long separations. Previous research was concerned with separation in institutionalized children (Bowlby, 1958), or with separation in an experimental framework, using baby monkeys (Harlow, 1961).

(3) Bowlby.

Furthermore, an investigation of the ways and means by which children cope with separation, based on a sample of 100 six-month-olds (1) capable of recognizing familiar people, found that 29% of them had developed several specific attachments simultaneously, with as many as 5 or more in 10% of cases.

At age 10 months, 87% of the same children were attached to several people, and one third of them were attached to 5 people or more. Aside from the mother, the people involved were those who were in contact with the child daily, including the father, grandparents, older brothers and sisters, neighbours and "caregivers".

These findings on multiple attachments are interesting in several respects. They involve both parents, people working with the children and institutions. They should reassure mothers who are obliged to leave their child for day care. Often such mothers find this situation distressing, and feel guilty about their absence. They fear both for the child and for the evolution of their relationship. They feel dispossessed, and sometimes even develop feelings of jealousy toward the "caregiving" person (2).

Some situations may be so conflictual that the child, who had become attached to one person, is suddenly places with someone else. He/she must then rebuild new ties, in a new situation.

Our understanding of attachment and multiple attachments result in some recommendations, which should improve the conditions under which small children are cared for by people other than their mother. It may not always be possible to follow these, but their application does have beneficial effects on children. The first recommendation is that the child be given time to develop ties with an unfamiliar person before he/she is left in that person's care. This is true even for several-months-old infants who do not protest when their mother leaves them with a stranger.

The mother should go, with the child, to meet the person, and leave him/her, first for very short lapses of time, then, gradually, for longer periods, so that the child may begin to establish a relationship, but also so that the separation is not a break, but rather, an introduction to a new rhythm in the relationship. The child should be given the time to learn to anticipate his/her mother's return (3). This requires that he/she be given stable, reassuring points of reference. Some day care centres practice this method, known as "integration". Parents' reactions are not always positive, for lack of information. Integration is valuable in day care centres as well as with unfamiliar individuals.

The second recommendation is that the number of people around a child be limited, while not reduced to just one, so that he/she will have an opportunity to built true relations with them. Children who are continually going from one person's arms to another are not only in a state of insecurity, but have no opportunity to learn to develop deep ties. There is a risk that their later relationships will tend to be superficial, like those they were led to establish during infancy.

A third recommendation is that whenever possible, children should not be left in an institution or with an unfamiliar person for the first time during the crisis period, characte-

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(1) Schaffer.

(2) This problem does not exist in cultures in which children belong to everyone, and not exclusively to their parents.

(3) In the domain of intellectual development this corresponds to the acquisition of the concept of "object permanence", before which objects only exist for the child when they are present.

rized by anxiety in the presence of strangers. This is often called "8th-month anxiety". For some children it occurs much earlier.

The last recommendation is that parents and future parents, as well as people specialized in infant care be made aware of the immense need for contact experienced by newborns and small children. These needs are as basic as the need for food, sleep and body care, and their satisfaction conditions the quality of child care.

At birth, it is important that the newborn be given prolonged contact with the mother, both for starting breast-feeding and for their new relationship. This is just as important as not separating mother and infant (at the maternity hospital or at home) during the first days after birth, so as to provide a transition between the close relationship experienced during gestation and the budding new ties. The latter require time in order to develop and blossom out, and unfortunately some mothers do not have enough time. Maternity leaves not only enable mothers to brest-feed their baby, they also give them this time. Unfortunatety, they do not exist everywhere, and when they do exist, some mothers are obliged to make only partial use of them. It would be advisable to generalize the practice of granting sufficiently long maternity leaves, so that breast-feeding, followed by weaning, may be conducted in a satisfactory ways and the establishment of strong ties begun. This would be a most valuable preventive measure, which would give children a good start in life, and have a positive influence on their physical and emotional development.

Time alone is not enough, however, for the establishment of a satisfactory relationship. It is most important that exchanges be rich, as well. This depends on how receptive the child is (his/her "state"), and on what exchanges occur (smiles, caresses, speech). It also depends on the adult's mental state during his/her relations with the child; on how present he/she is mentally, more than on any simple physical presence. Parents who work must take care to compensate for the time factor by the quality of contact in their relationship with the child. The same is true of mothers or caregivers who must care for several small children. They should organize a rhythm for exchanges, based on the amount of time they may devote to the child (in the morning, evening, on their days off, in the case of parents), and on their observations concerning the child's receptivity to contact and special sensitivity to any particular form of communication (caresses, being rocked, songs, etc.).

CONCLUSION

The ties established by human infants during gestation, at birth and during the first years of life are essential. They condition children's sense of security, their attachment to other human beings and their freedom to discover the world around them. These ties develop through interaction and are unique for each mother-child couple. Human infants play an active role in building these ties. They are born with a great potential for sensations and relations, which must be stimulated by other human beings in order to develop completely, and become functional.

At the onset of their communication, it is most important that mother-child contact be close and continuous, since the infant has limited skills. Once the first ties have been created, a space may be built up between the mother and the child. This is necessary if the child is to go from dependency to autonomy. This autonomy is both physical and mental. Physical exchanges between mother and child help the child to discover that he/she has a body of his/her own. The recognition of physical individuality precedes and conditions self-awareness on a mental plane.

Mother-child ties develop through communication. However, although all human beings are equipped to communicate, they do not necessarily or automatically do so. Communication requires the learning of a shared "language". The role of the smile cannot be overemphasized. Mothers must learn their child's language, and vice versa. The infant's first language is body language: it is based on sensation and movement. It changes, through contact with the mother and with other human beings. It becomes something intermediate between body language and thought (1), then reaches its ultimate level, which is completely symbolic: speech. The child's mental life, the construction of his/her thought processes and intelligence, and his/her ability to love, all depend upon his/her possibilities of communication.

Communicating with a child is a skill, which the mother and other adults must learn if they are to teach the child to communicate. Much time and energy are required to learn this skill. It is a difficult task, necessitating much effort, which is rewarded by love.

A loving relationship is built up through mutual exchanges. It is indispensable to human life. It is accessible to everyone, since it has no material prerequisites. It is not a privilege belonging to any one social class or country, be it developed or on its way to development. It is one commodity which is equally distributed.

It is the essence and the flavour of life.

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(1) Meaningful gestures and facial expressions.

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